SPATIAL ASSOCIATION OF GUBERNACULUM TRACT IN IMPACTED TOOTH USING CONE BEAM COMPUTED TOMOGRAPHY (CBCT)

A SYNOPSIS

Submitted for the Registration for the Degree

of

Doctor of Philosophy

in

ORAL MEDICINE & RADIOLOGY

Faculty of Dental Science

by

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Ph.D Synopsis
Format for Research Proposal

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Department	Oral Medicine and Radiology
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Title of proposed research project	Spatial Association of Gubernaculum Tract in Impacted Tooth Using Cone Beam Computed Tomography (CBCT)

Introduction :-

The successor tooth which is situated apically after the eruption deciduous tooth is enclosed by bone apart for a small tract containing connective tissue. This tissue mass i.e gubernaculum dentis made of fibrous band (gubernacular cord) within Gubernacular tract connects the follicular tissue of the successor tooth with the overlying gingiva. Gubernaculum dentis in the mixed dentition is an eruption pathway. Any alteration in this can lead to impaction of teeth and treatment with respect to these teeth requires a multidisciplinary approach and long treatment protocols. So diagnosing the cause of impaction becomes imperative and this gubernaculum tract can facilitate us out at an early stage.

Radiographic appearance of GubernaculumTract

Alteration in the angulation, path, curve, and obliteration of gubernaculum tract has been sporadically referred in the literature, in impacted, unerupted and delayed erupting teeth. Clinicians must precisely identify various characteristics of gubernacular tract/Canal to aid in performing dental treatments, especially traction and extraction of such teeth.

The eruption of anterior teeth may be obstructed by some factors related to GTs. Therefore, GTs should be precisely examined by imaging modalities like MDCT & CBCT Tomography, during the growth and development periods. It will be appreciated as a corticated tract of low density, contiguous with dental follicle. If the GT of a tooth is undetectable and/or has an abnormal angulation to the tooth axis as seen on MDCT and CBCT, the clinician should note that the eruption might be abnormal.

Review of literature

Nishida I et.al.(2015)retrospectively analyzed the detection and shape of gubernacular tract in unerupted permanent successors on CBCT or MDCT. Following CBCT or MDCT, the detection of GT in respective unerupted successor's teeth was also evaluated on panoramic radiographs. Their results concluded that, in patients with obstructive eruption, including impaction, the tract was deformed and was not visible on Computed Tomography and suggested that any alteration to the tract may be used to predict abnormal eruption of successor tooth by using MDCT or CBCT.

Oda M et. al. (2016) elucidated the characteristics feature of the GT in upper anterior teeth with normal and delayed eruption and in mesiodens. They demonstrated that detection ratio of GTs in upper anterior tooth with delayed eruption was lower than that in normal teeth. Moreover, that in mesiodens especially, inverted mesiodens were significantly lower. One most important things they suggested was GTs in majority of inverted mesiodens was potentially derived from incisive canal,

not from alveolar crest. The reason of inversion may be developmental anomaly of GT.

Aims

To evaluate the importance of gubernaculum tract (GT) in predicting the eruptive pattern of the teeth through Cone beam computed tomography.

Objectives

1. To draw out variations of the tract or path of Gubernaculum Tract (GT) associated with impacted tooth using Cone Beam Computed Tomography (CBCT)
2. To assess the changes in Gubernaculum Tract (GT) to predict altered eruption of impacted permanent teeth using Cone Beam Computed Tomography (CBCT) for better clinical outcome.
3. To assess the detection ratio of GT in impacted tooth

Relevance of the project

The impaction of maxillary and mandibular teeth (second most commonly impacted tooth after third molars, canines) is commonly encountered clinical problem, the treatment requires an interdisciplinary approach. The Surgical exposure of impacted tooth and the complex orthodontic mechanisms required to align the tooth into the arch may cause varying amounts of damage to the supporting structures of the tooth, alongwith long treatment duration and the financial burden to the patient. Therefore, it seems worthwhile to focus on early diagnosis and interception of this clinical situation. An association of altered GT can help us in diagnosing which tooth will be impacted or which tooth can erupt normally into the arch.

So an early diagnosis of this can help us in planning out the timely intervention and the tooth can be made to erupt normally.

Material & methods

All the patients (age group preferably between 6 yrs to 25yrs) will be selected and clinically missing teeth will be scrutinized for any impacted teeth with initial investigative procedures (IOPA, OPG). After detecting an impacted teeth be it a normal or supernumerary teeth, the informed consent will be obtained from the patients and they will be further subjected to CBCT images.

300 CBCT scan with impacted teeth will be checked for Gubernaculum tract (alterations)

Various sections of the CBCT images will be analyzed by the Radiologist and the association/ relationship between the impacted teeth and the GT will be evaluated on various sections of the CBCT and the changes in form of deformation and/ or obliteration of the GT will be noted (figure 2a and b).

Fig 1: CBCT images, axial and sagittal and frontal sections showing GT in normal teeth (white arrows)

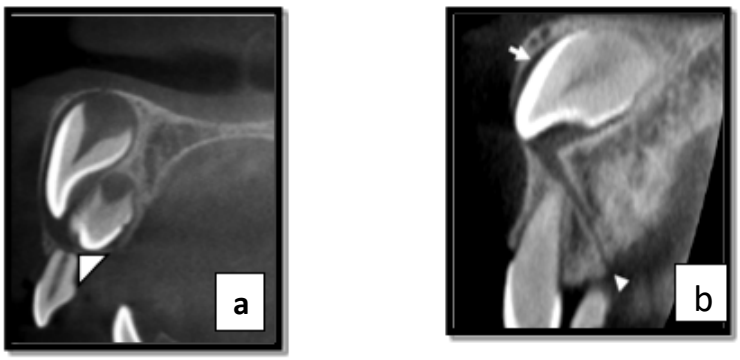

Fig 2a and 2b: CBCT image, showing absence of GT in impacted supernumerary tooth(arrow) and alteration in path and obliteration of GT(arrow) in impacted canine (white arrows)

Duration of proposed project

It will be carried out for a period of 1 ½ years.

References

1. Oda M, Nishida I, Miyamoto I, Habu M, Yoshiga D, Kodama M, et al. Characteristics of the gubernaculum tracts in mesiodens and maxillary anterior teeth with delayed eruption on MDCT and CBCT. Oral Surg Oral Med Oral Pathol Oral Radiol. 2016; 122(4):511–6.
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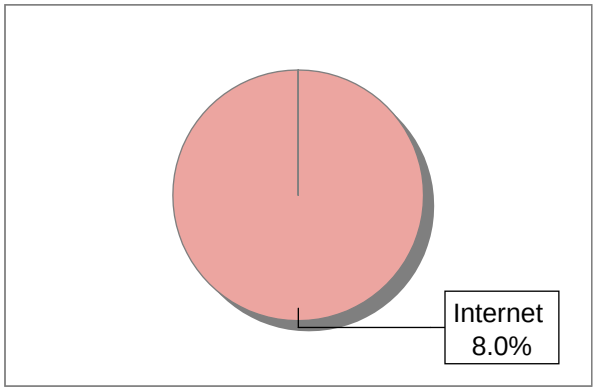

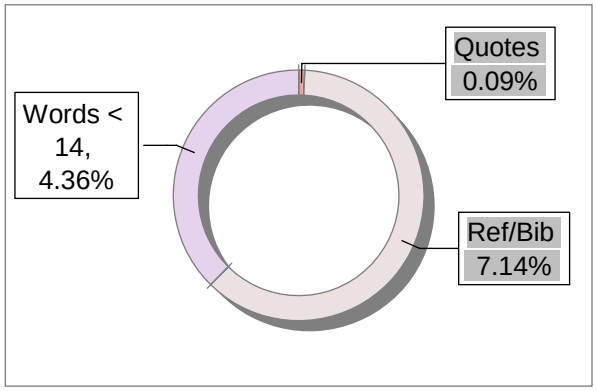

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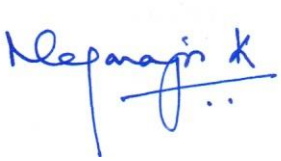
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